

ABSTRACT

Keel joint assemblies are described that permit a degree of rotational movement of a riser within the keel of a floating vessel and greatly reduce the amount of stress and strain that is placed upon the riser, as well. Keel joint assemblies described provide a limiting joint between the riser and the keel opening that permits some angular rotation of the riser with respect to the floating vessel. Additionally, the limiting joint permits the riser to move upwardly and downwardly within the keel opening, but centralizes the riser with respect to the keel opening so that the riser cannot move horizontally with respect to the keel opening. In described embodiments, the limiting joint is provided by a single annular joint that allows that riser to move angularly with respect to the can. In some embodiments, the keel joint assembly incorporates a cylindrical stiffening can that radially surrounds a portion of the riser and is disposed within the keel opening. In these embodiments, a flexible joint is provided between the can and the riser. Supports or guides may be used to retain the can within the keel opening.